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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PATEL, VINIT H	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 12/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/761,789	REI, MIN-HON	
	Examiner	Art Unit	
	Vinit H. Patel	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,7,9-16,19 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7,9-16,19 and 21-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *25Aug06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4 are rejected under 35 U.S.C. 103(b) as being unpatentable over Amiridis et al., WO/9943610 in view of People's Republic of China Document No. 96245413.3 (hereinafter "PRCD No. 94112487.8," (Abstract translation supplied by Applicant in IDS dated August 25, 2006)).

Regarding claim 1, Amiridis teaches a shell and tube reactor 30 module for hydrogen production, comprising: a reactor 30 having a shell side, at least one palladium membrane tube 32 as a tubular section, and a catalytic combustion section having a steam reforming catalyst 38 in said shell side, wherein said at least one palladium membrane tube has one sealed end 34 located at upstream of flowing path (P4/L4-30; P5/L1-30; Figs. 1 & 4), but does not explicitly teach the catalytic combustion chamber having a noble metal catalyst dispersed on supporting material surrounding the SR steam reforming catalyst. PRCD No. 94112487.8 teaches a catalytic combustion chamber (reactor) being a circular module having a transforming catalyst (steam reforming catalyst) inside the circular reaction (combustion chamber) module having a palladium (noble metal) content (Abstract), and it would have been obvious to one of

ordinary skill in the art at the time of the invention to modify Amiridis with PRCD No. 94112487.8 for the purpose to provide a high conversion rate of the hydrocarbon material to hydrogen (See Abstract)

Regarding claim 2, Amiridis teaches wherein said palladium membrane tube 32 is formed by mounting a palladium membrane on a porous support, wherein said palladium membrane is made of one selected from a group consisting of palladium, a palladium-silver alloy and a palladium-copper alloy (Fig. 1; P1/L7-29).

Regarding claim 3, Amiridis teaches wherein said porous support is made of stainless steel (P4/L4-20).

Regarding claim 4, Amiridis teaches wherein a length of said at least one tube is between 3 cm and 120 cm (Figs. 1 & 4; P4/L4-30).

Claims 7, and 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amiridis et al., WO/9943610 in view of People's Republic of China Document No. 96245413.3 (hereinafter "PRCD No. 94112487.8," (Abstract translation supplied by Applicant in IDS dated August 25, 2006)), Clawson et al., USP 6,648,480 and Willms, USP 5,525,322.

Regarding claim 7, Amiridis in view of PRCD No. 94112487.8, teaches all of the limitations as applied to claim 1 above and further discloses a steam reforming catalyst bed, but does not explicitly teach the steam reforming catalyst is one of CuOZnOAl.sub.2O.sub.3, PdOCuOZnOAl.sub.2O.sub.3 and K.sub.2O,NiO/.gamma.-Al.sub.2O.sub.3. Clawson teaches a reactor for hydrogen production wherein the steam reforming catalyst is one of CuOZnOAl.sub.2O.sub.3, PdOCuOZnOAl.sub.2O.sub.3 and

K.sub.2O,NiO/.gamma.-Al.sub.2O.sub.3 (C3/L15-33), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Amiridis in view of PRCD No. 94112487.8 with Clawson for the purpose to provide a catalyst with high activity (C4/L24-40 of Willms).

Regarding claim 9, Amiridis teaches a catalytic combustion section is made of a stainless steel (P4/L4-20; Fig. 4).

Regarding claim 10, Clawson teaches a noble metal is selected from a group consisting of platinum (Pt), palladium (Pd), rhodium (Rh), Ruthenium (Ru) and a mixture thereof (C3/L15-65).

Regarding claim 11, Clawson teaches a shell and tube reactor module according to claim 8, wherein said supporting material is one selected from a group consisting of .gamma.-alumina, titania, zirconia, silica and alumina-platinum (C3/L15-65).

Regarding claim 12, Clawson teaches a a reservoir containing fuels without H.sub.2O provided for starting up heating (Figs. 1 & 2).

Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amiridis et al., WO/9943610 in view of People's Republic of China Document No. 96245413.3 (hereinafter "PRCD No. 94112487.8," (Abstract translation supplied by Applicant in IDS dated August 25, 2006)).

Regarding claim 13, Amiridis teaches a shell and tube reactor 30 module for hydrogen production, comprising: a reactor 30 having a shell side, at least one palladium membrane tube 32 as a tubular section, and a steam reforming catalyst 38 in said shell side, wherein said at least one palladium membrane tube has one sealed end

34 located at upstream of flowing path (P4/L4-30; P5/L1-30; Figs. 1 & 4), but does not explicitly teach the catalytic combustion chamber having a noble metal catalyst dispersed on supporting material surrounding the SR steam reforming catalyst. PRCD No. 94112487.8 teaches a catalytic combustion chamber (reactor) being a circular module having a transforming catalyst (steam reforming catalyst) inside the circular reaction (combustion chamber) module having a palladium (noble metal) content (Abstract), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Amiridis with PRCD No. 94112487.8 for the purpose to provide a high conversion rate of the hydrocarbon material to hydrogen (See Abstract). Furthermore, the references do not explicitly teach a reactor splitting into two reactor sections and having a common shell. However, such modification is a mere duplication of parts has no patentable significance unless a new and unexpected result is produced and it would have been obvious to one of ordinary skill in the art to modify Amiridis to include a reactor having two duplicate reactor sections for the purpose to increase hydrogen output. See MPEP 2144.

Regarding claim 14, Amiridis teaches wherein said palladium membrane tube 32 is formed by mounting a palladium membrane on a porous support, wherein said palladium membrane is made of one selected from a group consisting of palladium, a palladium-silver alloy and a palladium-copper alloy (Fig. 1; P1/L7-29).

Regarding claim 15, Amiridis teaches wherein said porous support is made of stainless steel (P4/L4-20).

Regarding claim 16, Amiridis teaches wherein a length of said at least one tube

is between 3 cm and 120 cm (Figs. 1 & 4; P4/L4-30).

Claims 19 and 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amiridis et al., WO/9943610 in view of Clawson et al., USP 6,648,480 and Willms, USP 5,525,322.

Regarding claim 19, Amiridis teaches all of the limitations as applied to claim 13 above and furthed discloses a steam reforming catalyst bed, but does not explicitly teach the steam reforming catalyst is one of CuOZnOAl.sub.2O.sub.3, PdOCuOZnOAl.sub.2O.sub.3 and K.sub.2O,NiO/.gamma.-Al.sub.2O.sub.3. Clawson teaches a reactor for hydrogen production wherein the steam reforming catalyst is one of CuOZnOAl.sub.2O.sub.3, PdOCuOZnOAl.sub.2O.sub.3 and K.sub.2O,NiO/.gamma.-Al.sub.2O.sub.3 (C3/L15-33), and it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Amiridis with Clawson for the purpose to provide a catalyst with high activity (C4/L24-40 of Willms).

Regarding claim 21, Amiridis teaches a catalytic combustion section is made of a stainless steel (P4/L4-20; Fig. 4).

Regarding claim 22, Clawson teaches a noble metal is selected from a group consisting of platinum (Pt), palladium (Pd), rhodium (Rh), Ruthenium (Ru) and a mixture thereof (C3/L15-65).

Regarding claim 23, Clawson teaches a shell and tube reactor module according to claim 8, wherein said supporting material is one selected from a group consisting of .gamma.-alumina, titania, zirconia, silica and alumina-platinum (C3/L15-65).

Response to Arguments

Applicant's arguments, see 6-9, filed September 19, 2006, with respect to the rejection(s) of claim(s) 1 and 13 under 102(b) and 103(c) respectiviely, have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Applicant amended claims 1 and 13 to include the specific limitation directed to a catalyst combustion section having a noble metal catalyst dispersed on a supporting material and surrounding the steam reforming catalyst. The new grounds for rejection (see rejections above) rejects the limitation based on People's Republic of China Document No. 96245413.3, (hereinafter "PRCD No. 94112487.8," (Abstract translation supplied by Applicant in IDS dated August 25, 2006)).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vinit H. Patel whose telephone number is (571) 272-0856. The examiner can normally be reached on 9:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

VHP

Glenn Caldarola
Supervisory Patent Examiner
Art Unit 1700